INDUSTRIAL DIAMOND ABSTRACTS

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PHYSICAL, CHEMICAL & MECHANICAL PROPERTIES OF DIAMOND AND OTHER HARD MATERIALS

Deformation twinning in the diamond structure

R. Bullough (Res Lab, AEI Ltd, Aldermaston, Berks). *Royal Soc Proc A* 1957 Vol 241 (1227) pp 568-577 (Sep 10)

The theory of surface dislocations is used to calculate the most likely deformation twinning plane in the diamond structure. The surface dislocation representing the twin boundary is assumed to correspond to one parallel array of like, glissile dislocations, *ie* a simple glissile surface dislocation. The treatment indicates that, in the diamond structure, deformation twinning of the first kind ought to occur on the {123} planes. 1 illustr, 8 ref. *W* *C 2.51*

A new technique in centrifugal mineral separation

D. R. Cheeseman. *Canad Mineralogist* 1957 Vol 6 (1) pp 153-155

An improved tube for rapid and efficient separation of sink-and-float products in heavy mineral separation using bromoform and a centrifuge is described. The method is particularly applicable to very fine grained minerals and mineral powders, and gives a quick and clean separation of light and heavy fractions without contamination. 1 illustr, 2 ref.
Y *C 1.32*

Role of atmospheric oxidation in high speed sliding phenomena

M. Cocks (Ford Motor Co). *Journ Appl Phys* 1957 Vol 28 (8) pp 835-843 (Aug)

Experiments are described which were used to determine the role of oxidation in inhibiting metallic interaction between metal surfaces sliding at high speed. Hardness, friction and wear measurements are presented for testpieces of hardened steel. Tearing of the metal surfaces decreased as the load increased and it is concluded that this was due to the increased oxidation associated with the greater frictional heating. 13 illustr, 29 ref. *W* *C 2.23*

With this issue, the title of this journal changes from BIBLIOGRAPHY OF INDUSTRIAL DIAMOND APPLICATIONS to one that is felt to be both simpler and more comprehensive—INDUSTRIAL DIAMOND ABSTRACTS. No change of policy is envisaged, and volume numbering has been retained.

Colour centres in irradiated diamonds. I

C. A. Coulson, M. J. Kearsley. *Royal Soc Proc A* 1957 Vol 241 (1227) pp 433-454 (Sep 10)

A theoretical calculation of the energy levels, and hence absorption spectrum, of an isolated vacancy in an otherwise perfect diamond lattice has been made. The concept of a defect molecule is introduced thus enabling familiar molecular orbital theory to be applied in calculating the electronic structure of the defect. The quantitative results suggest that the observed band at 2.0 eV, causing irradiated diamonds to appear blue, is due to spin and orbitally-allowed electronic transitions of symmetry $^1E \rightarrow {}^1T_2$ in the neighbourhood of isolated neutral vacancies. 5 illustr, 36 ref, 5 tables.
W *C 2.26*

Metal transfer in sliding contacts

D. G. Flom (GE Res Lab). *Journ Appl Phys* 1957 Vol 28 (8) pp 850-854 (Aug)

The transfer of radioactive silver from silver-graphite riders has been studied quantitatively in sliding contact with graphite and copper. Four new features were uncovered which may be unique to systems involving graphite, *ie* (*i*) a high initial rate of transfer; (*ii*) a marked increase in transfer with increased surface roughness; (*iii*) increased transfer following the addition of water to the rider track, and (*iv*) virtual independence of net transfer on sliding speed. 9 illustr, 8 ref, 1 table. *W* *C 2.23*

Development of the science of crystal forms

I. I. Shafranovskii. *Kristallografiya* 1957 Vol 2 (3) p 326; *DSIR Transl Contents Lists Russ Period* 1957 (105) p 47 (Dec) (In Russian)
X *C 2.5*

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Inclusions in diamonds. Einschluesse in Diamanten

E. Guebelin. *Gold & Silber* 1957 Vol 10 (11) pp 27-30 (Nov) (In German)

The so-called 'carbon spots' in diamonds are often not carbon but some other mineral. They are often amorphous parts of the original ground mass which produce a total reflexion of the incident light and thus appear black. Some of the mineral inclusions are older than the diamond itself which accounts for the fact that they are found in various degrees of perfection. Others, *eg* olivine crystals, must have formed simultaneously with the diamond as witnessed by their respective crystallographic orientations. In many cases, one diamond has grown around another. The most usual crystallographic form of such diamond inclusions in diamond is the octahedron with rounded edges. The enclosed diamond is usually darker than the surrounding one and frequently enveloped in a layer of amorphous carbon or ground mass. Included zirconium is often associated with local cracks and stresses and diamonds with such inclusions tend to shatter during grinding. Garnet inclusions are characteristic of South African diamonds. Magnetite inclusions were probably formed at the same time as the diamond and usually maintain their crystallographic form. Quartz inclusions occur in Brazilian diamonds but never in South African ones. Gaseous and liquid inclusions are also briefly surveyed. 7 illustr, 7 ref. *H* *C 2.3*

A surface electroluminescence effect in diamonds

H. J. Logie, R. R. Urlau (Witwatersrand Univ). *Nature* 1957 Vol 180 (4597) pp 1254, 1271 (Dec 7)

Ten type I diamonds were found to luminesce with bright green spots of light when a potential difference was applied to them; the effect was first noticed while investigating the counting properties of the diamonds and occurred only after the diamonds had been coated with a thin layer of graphite and annealed in this condition. Due to the high refractive index the whole diamond appeared to luminesce with a band of wave lengths in the 5400 Å region, but microscopic inspection showed that the luminescence was confined to small spots. The diamonds returned to their normal state when the surface had been cleaned. The effect is felt to confirm recent observations by A. Fischer (*Zeits Phys* 1957 Vol 149 p 107) that when the dielectric properties of the diamond are broken down by sufficiently high currents and fields, a green luminescence is observed. The breakdown processes may produce graphitization of parts of the diamond so causing an effect similar to that reported here. 2 ref.
Y *C 2.24*

Artificial coloration of diamond

H. B. Dyer. *Gemmologist* 1957 Vol 26 (316) pp 193-199 (Nov)

Paper to International Diamond Exhibition, Amsterdam, June 21 - July 14, 1957.

The study of colour in diamond by means of the spectrophotometer is discussed and the relation between colour and imperfections, particularly in regard to electron radiation, is outlined. 9 illustr, 5 ref.
Y *C 2.26 : C 2.27*

Properties and applications of titanium nitride and titanium carbide. Eigenschaften und Anwendungen von Titannitrid und Titancarbid

A. Muenster. *Angew Chem* 1957 Vol 69 (9) pp 281-290 (May 7) (In German)

TiC and TiN are of great technical interest because of their hardness, high melting-point and chemical stability. Production methods and physical and chemical properties are described. 14 illustr, 67 ref, 10 tables. *W* *C 2.2*

The etching of diamonds by low pressure oxygen

M. Omar, M. Kenawi (A'in Shamo Univ, Cairo). *Phil Mag* 1957 Vol 2 (19) pp 859-863 (July)

Rectilinear etch figures have been produced artificially on diamond in a series of experiments using a new technique. The experimental crystal was placed on a molybdenum filament under vacuum of the silvering plant and heated to a temperature of about 1,000° C. The favourable pressure used was about 2.5 microns of mercury. After about 7 hours under etching conditions, etch figures appeared. As the figures increased in size, smaller figures appeared; finally a pattern was obtained which was identical to the usual pattern of trigons. This new observation constitutes a return to the theory that trigons are etch figures, and this is in direct opposition to Tolansky's findings which suggested they were a growth phenomena.

(For reply from S. Tolansky, see *Bibl Ind Diamond Appl* 1957 Vol 14 p B197 (Nov)). 16 illustr, 9 ref.
W *C 2.51*

Interlayer spacings of graphitic carbons

Anon. *Nature* 1957 Vol 180 (4596) pp 1184-1185 (Nov 30)

6 ref, 1 table. *Y* *C 2.51*

Adhesion of solids : principles and applications

O. L. Anderson. *Bell Lab Rec* 1957 Vol 35 (11) pp 441-445 (Nov)

7 illustr. *Y* *C 2.23*

Macroscopic edge dislocations in crystals of corundum

V. L. Indenbom, G. E. Tomilovskii. *Kristallografiya* 1957 Vol 2 (1) p 190; *DSIR Transl Contents Lists Russ Period* 1957 (105) p 44 (Dec) (In Russian)

X *C 2.51*

Synthesis of diamonds. II. Die Synthese des Diamanten. II

A. Neuhaus, H. Meyer. *Angew Chem* 1957 Vol 69 (17) pp 551-557 (Sep 7) (In German)

In continuation of an earlier discussion on the problem of diamond synthesis, the most recent papers in this field are reviewed. The syntheses of GE and ASEA are considered, together with their underlying theoretical principles and engineering data. It is shown that the success of diamond syntheses is due to the recent rapid developments in the field of high pressure/high temperature autoclave technique. Other possible applications of this new knowledge are considered.

See also *Bibl Ind Diamond Appl* 1954 Vol 11 p B282.
W *C 2.6*

Pressure chamber

Nucor Research Inc. *Met Prog* 1957 Vol 72 (5) pp 23, 25 (Nov)

A test unit has been developed for providing pressures up to 30,000 atm in a chamber ½ in. in diameter by 10 in. high. *Y* *C 2.6*

Hydrothermal sapphires

Bell Telephone Lab. *Chem Engg News* 1957 Vol 35 (38) p 62 (Sep 23)

Sapphires of ¼ × ¼ × ¼ in. have been grown by a hydrothermal process which operates above 400° C and 30,000 lb/sq in. A small silver-lined autoclave is filled to 70-80% of its free volume with one molar sodium carbonate. Reagent alumina, or aluminium hydroxide, goes in the bottom of the reaction cavity; seed crystals, cut from a corundum bar, are suspended on a silver frame in the top. With this assembly under reaction conditions, the nutrient dissolves in the sodium carbonate, supersaturates it and redeposits on the seeds. The physical action is not yet clearly understood.
W *C 2.61*

DIAMOND IN INSTRUMENTS, ETC

The superfinishing of friction bearings. Feinstbearbeitung von Gleitlagern

Anon. *Technica* 1957 Vol 6 (23) pp 1343-1348 (Nov 8) (In German)

(Cont). The important characteristic of a bearing surface is the 'bearing portion' which, though related to the depth of roughness, is not identical with it. A bearing portion of 80% is high but can be achieved only if the overall shape of the part is satisfactory as well as the surface finish. There is no risk that too tight a fit will prevent the passage of an oil film since this can be as thin as 0.1 millimicron, but for many purposes surfaces ground to $R = 0.2 - 0.3$ micron with the cross-hatch pattern are perfectly adequate.

The bearing portion can be measured *in situ* by means of the total reflexion obtained in a diamond prism rested on the machined surface. In the Visoport instrument, the diamond prism is freely suspended to give immediate contact with the test surface. The force with which it is pressed against the surface is adjustable. (Concl). 15 illustr.

H *C 3.24 : C 13.4*

Precision photoetching of scientific scales

R. Davis, C. I. Pope (US Nat Bur Standards). *Glass* 1957 Vol 34 (10) pp 457-458 (Oct)

Improved techniques for producing precision etched glass scales are described. The 2 Bureau-designed engraving machines which aided the development of the glass etching process used diamond or steel ruling and scribing tools. 1 illustr.

W *C 7.2 : C 10.2*

An introduction to semiconductors

W. C. Dunlap jr. *Franklin Inst Journ* 1957 Vol 264 (3) p 251 (Sep)

Book. John Wiley & Sons Inc, New York. 6 × 9 in., 417 pp, illustr, 1957. Price $11.75.

The subject is dealt with at an intermediate level suitable for physicists and engineers approaching the subject for the first time. The properties of semiconducting elements and compounds are thoroughly analysed, with an emphasis on diamond and germanium. *W* *C 2.25 : C 3.25*

Effect of edge dislocations on the alloying of indium to germanium

J. I. Pankove (RCA Lab). *Journ Appl Phys* 1957 Vol 28 (9) pp 1054-1057 (Sep)

A detailed study of the alloying mechanism shows (*i*) edge dislocations and other crystal disturbances enhance the dissolution of germanium in indium, (*ii*) the recrystallized structure over an edge dislocation differs considerably from the structure at undisturbed sites, and (*iii*) the shape of the alloy front is determined by surface tension forces and a tendency to terminate in (111) planes.

In the experiments, scratching of germanium slices was effected with a diamond point. 10 illustr, 7 ref.

W *C 3.23*

Properties and uses of industrial crystals

S. Hahn (Linde Co). *Prod Engg—Design Digest Issue* 1957 Vol 28 (15) pp C18-C21 (Mid-Oct)

The materials dealt with are corundum, spinel and titania, their methods of manufacture and properties being briefly described. Optical and polishing applications of industrial sapphires are outlined. 4 illustr, 5 tables. *Y* *C 3.24 : D 14.1*

The preparation and industrial applications of diffraction gratings

L. A. Sayce. *Soc Instr Technol Trans* 1957 Vol 9 (4) pp 139-143 (Dec)

Paper presented to a meeting of the Society of Instrument Technology, Apr 30, 1957, with discussion.

The history of the manufacture of diffraction gratings is summarized and the improved techniques developed in recent years to meet modern requirements are described. An account is also given of the many applications of diffraction gratings in industry today. 8 illustr, 6 ref. *Y* *C 10.21*

Carbide scriber cuts spring steel

D. Shaw. *Metalworking Prodn* 1957 Vol 101 (48) p 2147 (Nov 29)

Because of the hardness of spring steel it is practically impossible to lay out work on it with a height gauge equipped with an ordinary tool steel scriber. An account is given of the replacing of this scriber by a carbide tipped tool bit suitably ground. Careful grinding to ensure a sharp cutting edge to the tips of the dividers and the point of the scriber is important.

Y *C 10.21 : C 12.21*

Ultra-thin serial sectioning with rocking microtomes

A. Charles (Leeds Univ). *Nature* 1957 Vol 180 (4597) p 1302 (Dec 7)

A well-known difficulty in using rocking microtomes for ultra-thin sectioning is the tendency for the cut section to be picked up on the return stroke. A non-mechanical simple device is described which is claimed to avoid this. 1 ref. *Y* *C 3.26*

Observations on the behaviour of diffraction gratings

J. Guild. *Phys Soc Year Book* 1957 pp 30-48

19th Thomas Young oration to the Society, May 15, 1957.

Faults are discussed and various tests for accuracy described. 8 illustr, 8 ref. *W* *C 10.21*

A mechanism to control the pressing in of jewelled bearings. Kontrollvorrichtungen fuer das Einpressen von Lagersteinen

I. N. Woronzoff. *Feingeraetetechnik* 1957 Vol 6 (11) pp 490-491 (Nov) (In German)

2 illustr, 1 ref. *H* *C 3.21*

HARDNESS AND WEAR TESTING

Effect of microstructure on the abrasion wear of carbon steels

V. M. Guterman, M. M. Tenenbaum. *Metalloved i Obrabotka Metall* 1956 (11) pp 15-23; *Chem Abstr* 1957 Vol 51 (12) p 8612 (June 25)

As the wear resistance of steels having the same hardness might vary widely, a study was conducted in order to establish the relations between wear and metallographic structure at the same hardness level. Abrasion characteristics of annealed steels, quenched and drawn steels and martensitic steels are described. Abrasion test results were checked by data obtained by scratching specimens with a diamond point.

W *C 3.23 : C 4.0*

LITERATURE REQUESTS

Please quote the page number of the journal containing the original reference, and the author and title of the article, in all cases.

A new standard hardness testing machine

R. S. Marriner, F. C. P. Mason (NPL). *Machinery* (London) 1957 Vol 91 (2349) pp 1225-1230 (Nov 22)

In order to make it possible to assign a reliable single hardness value to a test block, the variability arising from any one, or combination, of the following sources must be eliminated or reduced : (*i*) real differences in hardness between different areas of the test block, (*ii*) failure of the indenting machine to make identical indentations due to internal defects or external vibration, (*iii*) imperfections in the indentation preventing precise definition of the ends of the diagonals, (*iv*) inability to set and read precisely the microscope used, and (*v*) random errors inherent in the process of forcing a diamond pyramid into a heterogeneous material such as steel.

It was decided that sources of error can be more easily determined by the Vickers method than others and a new dead-weight indenting machine using a 136° pyramid indenter with standard loads of 30, 50, 100 and 120 kgf (kg-force), has been designed and constructed, together with a suitable measuring microscope. 3 illustr, 2 tables.

Y *C 4.0*

Controlled slack quenching of impact specimens

Anon. *Technical News Bull* 1957 Vol 41 (10) pp 161-163 (Oct)

The method of studying impact properties of slack quenched structures is correlated, in a hardness survey along the length of the specimen, with the microstructures. Numerous hardness and metallographic surveys from centre to surface of impact specimens after the removal of the decarburized layer have established the uniformity of hardness and microstructure in any plane above the immersion level and parallel to the quenched end. 3 illustr.

Y *C 4.0*

Measuring temperature dependence of mechanical properties of plastics

K. Ito. *Mod Plastics* 1957 Vol 35 (3) pp 167-168, 170, 172 (Nov)

A simple and rapid method of measuring the temperature dependence of the mechanical properties of plastics is described. A test specimen is heated at a constant rate of 2° C/minute and Rockwell hardness tests are made. The thermal behaviour of the specimen, *eg* transition to entropy elasticity, flow phenomena, etc, can be demonstrated by the Rockwell number-temperature curves obtained. 8 illustr, 1 table.

W *C 4.0*

Microhardness evaluation of a hot-rolled uranium rod for drawing

M. T. McGowan, H. S. Rubenstein, R. M. Treco. *US Atomic Energy Comm* 1956 TID-7523 pp 35-37 ; *Chem Abstr* 1957 Vol 51 (7) pp 4907-4908 (Apr 10)

A detailed microhardness investigation of a hot rolled U rod before and after β irradiation and drawing revealed the presence of non-uniform hardening throughout the cross-section. The data were obtained by using a Kentron microhardness tester with a Vickers diamond pyramid indenter ; test checks were made with a Rockwell hardness tester.

W *C 4.0 : C 4.32*

The Vickers hardness of sphalerite

A. Henriques. *Arkiv Mineral Geol* 1957 (2) pp 283-297 ; *Chem Abstr* 1957 Vol 57 (13) pp 9422-9433 (July 10)

Results are given of tests on 21 samples of finely polished sphalerite performed with the aid of a Durimet microhardness tester with a Vickers diamond indenter.

W *C 4.0*

The development of a macro-hardness recorder. Beitrag zur Entwicklung des Makro-Haerteschreibers

R. Boeklen. *Werkstattstechnik & Maschbau* 1957 Vol 47 (11) pp 627-630 (Nov) (In German)

The macro-hardness tester is used with loads of up to 1000 kg, applied by a spring mechanism. The depth is recorded automatically and mechanically with 400 × magnification. It is argued that, provided the indenter has a perfectly sharp point, the curve of depth of penetration *vs* load must be a parabola as long as the material is uniform. Any variation of hardness would be shown up as a kink in the recorded curve. Two examples of such curves are given. A diamond pyramid with 100° angle and 0.1 mm radius of curvature at the point is found most suitable for this purpose and the results obtained with such an indenter compare favourably with those obtained with a standard Rockwell indenter. It is claimed that the position of a change in hardness in the material can be located with an accuracy of ±0.04 mm. Numerous applications of this method are mentioned and its advantages over other methods of determining the depth of hardening are enumerated. 6 illustr, 9 ref, 1 table.

H *C 4.0*

TRUING OF GRINDING WHEELS

The production of ball and roller bearings

Hoffmann Mfg Co Ltd. *Machinery* (London) 1957 Vol 91 (2346) pp 1012-1024 (Nov 1)

The various grinding and lapping operations which follow heat treatment are discussed. Inner races are face ground on a Blanchard single wheel vertical machine, outer races mostly on a double-sided Gardner machine. Wheel truing is performed once per 10,000 to 20,000 components. Inner and outer races are ground externally, in roughing and finishing stages, on Cincinnati centreless machines. Inner race bores are ground to finish size, *ie* +0.0002 −0.0003 in. on Bryant and UVA machines.

Bore grinding is completed on fully automatic, hopper-fed Bryant type 2209D machines, which also grind tracks on outer races. When the component has been loaded and the loading arm swung aside, the wheel-head advances to the grinding position and is reciprocated and fed transversely. During rough grinding the head is fed to a preset position and withdrawn ; as it is retracted, the wheel is moved past a truing diamond, after which the head returns to the operation position for finish grinding. The diamond truing attachment is mounted pivotally, and on completion of the roughing stage the diamond holder is swung downwards into line with the wheel, which is moved back at truing speed. Once the wheel is clear of the diamond, this is swung upwards, in readiness for the return of the head for the finishing stage. Norton or Universal wheels are used and run at 21,000 or 34,000 rpm. according to work and wheel diameters. The outer race tracks are lapped on pendulum type machines. Automatic gauging and sizing and the Hoffmann roundness tester are described. 20 illustr.

R *C 5.0 : C 12.6*

Automatic wheel dressing to tenths

Hoglund Engg & Mfg Co Inc, 343 Snyder Avenue, Berkeley Hts, NJ. *Grinding & Finishing* 1957 Vol 3 (6) p 58 (Nov)

The Hoglund model 89 hydraulic contour wheel truer is designed for use with cylindrical grinders, and will true any angle on the wheel, both perpendicular and horizontal. 1 illustr.

Y *C 5.0*

FINE BORING AND FINE TURNING OF METALS

Chip forming tools. Werkzeuge der spanenden Formung
H. Cornely. *VDI Zeits* 1957 Vol 99 (33) pp 1697-1700 (Nov 21) (In German)

Various cutting materials, particularly ceramic materials, and their method of operation are described. New developments in chip forming machining methods such as turning, drilling, milling, thread cutting and grinding are reviewed and numerous references are given. 3 illustr, 60 ref, 1 table.
H *C 6.0*

Special boring bar slashes machining cost
Excel Machine Products. *Metalworking Prodn* 1957 Vol 101 (40) p 1788 (Oct 4)

By simultaneously cutting an ID groove and shoulder on a stainless steel tube, machining time was reduced considerably, with a 76% saving per piece. The combination was accomplished with a Waldes Truarc model B grooving tool mounted in a Morse taper socket on the toolpost. The tool is equipped with an elongated, reduced spindle assembly, an elongated pilot bushing designed to fit the ID of the bore, an elongated cutter shaft and a double cutter. The spindle assembly provides approximately the correct location for the double cutter on its end. Once the tool has been set, no further adjustments are necessary. 1 illustr.
R *C 6.2*

The drilling force diagram as a criterion of the shape and power of a drill. Das Borhschaubild als Kriterium der Bohrerform und -leistung
H. H. Klein. *Werkstattstechnik & Maschbau* 1957 Vol 47 (11) pp 597-603 (Nov) (In German)

The cutting forces during drilling can be recorded automatically by means of an electric resistance bridge in conjunction with a photographic tracer. These diagrams show the variation of the cutting forces with the drilling progress and allow conclusions to be drawn as to the effect of altering the pitch and lip angle and the shape of the groove of twist. The effect of tool wear, changes in speed of rotation and feed are also shown. 15 illustr, 7 ref, 3 tables.
H *C 6.0*

Automatic profiling systems for machine tools
R. Lawson. *Soc Instr Technol Trans—Preprint* 1957 10 pp (Dec)

Automatic profiling systems in common use are classified, and descriptions of some are briefly given. The merits of various types are compared in terms of accuracy, speed of operation, and cost. Finally, some consideration is given to the way in which machine-tool parameters affect the performance of a profiling system, with particular reference to electronic control. 25 illustr.
Y *C 6.0*

The machinability concept
K. G. Lewis. *Metal Treatment* etc 1957 Vol 24 (144) pp 351-357 (Sep)

Various formulae developed to assess machining performance by tensile properties are reviewed. It is stressed that correlation of tool life with the microstructure of the workpiece constitutes one of the most reliable methods of assessment. Tool performance is affected by the composition and condition of the tool material, abrasive action of the work, cutting temperature and the relation between material and machine variables. The author concludes that existing methods provide an indication rather than a quantitative result and require careful interpretation. 1 illustr, 27 ref, 1 table.
R *C 6.5*

The cooling of tools. Kuehlung der Werkzeuge
Anon. *Technik & Betrieb* 1957 Vol 9 (11) (insert) (Nov) (In German)

The life of tools is greatly affected by the right type of cooling. At very high cutting speeds only the tool and not the workpiece should be cooled. In some carbide tools the coolant is therefore fed along the shaft and plays on the bit only. Other types of cooling and lubrication are considered.
H *C 6.0*

The way to work to 0.000,01 inch
N. R. Blumenstock. *Metalworking Prodn* 1957 Vol 101 (49) pp 2184-2185 (Dec 6)

An account is given of the assembly and testing of miniature nerve centres for supersonic missiles and aircraft guidance systems at Reeves Instrument Co. Dental drills together with other dental instruments are used in delicate deburring operations. 7 illustr.
Y *C 6.0 : C 7.25*

Why precise bores may not be precise
W. C. Carr. *Metalworking Prodn* 1957 Vol 101 (40) pp 1784-1785 (Oct 4)

Fixtures for accurate boring require rigidity and strength and locating devices must be accurately located in parallel and angular relationships. Cams should be checked for wear. Minor flaws in hydraulic table systems may cause machining errors. Belts and pulleys must be tight and motors must deliver full power to the boring head. A vibration analyser is recommended. Where boring quills are used, rigidity and minimum overhang with maximum feasible quill diameter are important; quill adaptation is not advisable. Sintered carbide should be brazed on the end rather than on the top or face of the tool. Belts, tools and machine base should be checked. 3 illustr.
R *C 6.0*

Operating condition criteria for production metal cutting
Nat Twist Drill & Tool Co. *Metal Cuttings* 1957 pp 2-6 (Oct)

An increase in speed or feed per cutting edge results in decreased tool life, the decrease for a given increase in speed being much greater than for a corresponding increase in feed. For a maximum number of pieces per tool sharpening, highest possible feed should be coupled with somewhat reduced speed. Surface finish and accuracy are principally functions of feed, lower feeds yielding smoother finishes. Over a wide range, finish and accuracy are not affected by cutting speed so long as the tool remains sharp. Finishing cuts require reduced feeds and slightly increased speeds. The various cost factors making up the total machining operation are discussed. The cost of a medium priced tool is assumed to be 20× the cost of the load, unload and idle time per tool change. Minimum production time occurs at a speed about 30% above that yielding minimum cost, but there is only a 5% gain in production time over the relative minimum cost speed of 100. As the best cutting speed is approached, a sizeable amount of total time or cost is due to loading, unloading and idling. Savings may be effected through improved work handling methods. 3 illustr. *R* *C 6.0*

The effect of tool-chip contact area in metal machining
H. Takeyama, E. Usui. *ASME Preprint* No (57-A-45) 1957 5 pp; *Index Aeronaut* 1957 Vol 13 (11) p 78 (Nov)

An analytical and experimental investigation to (*i*) clarify the meaning of coefficient of friction in metal machining, (*ii*) analyse the stress distributions on the rake face, and (*iii*) investigate the significance of tool-chip contact area in metal machining.
X *C 6.0*

Method for making very small holes in metals

R. Marks. *Rev Sci Instr* 1957 Vol 28 (5) p 381 (May)

It is claimed that very small holes can be obtained by pressing a pointed cone into a piece of metal to within a small distance of the other side, and then grinding off the material opposite the point of the conical cavity until the hole is reached. A tungsten carbide punch was used in the experiment described and a hole of approximately 0.0003 to 0.0004 in. diameter was obtained. *W* *C 6.0*

Correct cooling and lubrication—better tool performance. Richtiges Kuehlen und Schmieren—Bessere Werkzeugleistung

K. R. Pawlowitz. *Technik & Betrieb* 1957 Vol 9 (11) (insert) (Nov) (In German)

Two-thirds of the cutting force is spent in deforming the chip and one-third in overcoming the friction between chip and tool; tool wear increases with cutting temperature. Under certain cutting conditions (small cutting angle and low speed), some chip particles are welded to the tool and, when torn out again, carry particles of tool with them. The formation of a built-up edge along the cutting edge must be suppressed by suitable cooling. The friction between tool and workpiece can be reduced by lubrication. On the other hand, the force required for plastic deformation is inversely proportional to the temperature of the material. Neither tool nor workpiece must therefore be cooled at the point of contact. Some Italian firms have improved the machinability of some materials by pre-heating the surface. 2 illustr. *H* *C 6.0*

The chattering lathe tool. I

S. A. Tobias, W. Fishwick. *Metalworking Prodn* 1957 Vol 101 (49) pp 2180-2183 (Dec 6)

Two types of chatter are considered and distinguished depending on whether chatter amplitudes fall in the direction of the tool chatter or workpiece velocity. Physical causes considered are chip thickness variation effect, penetration effect and the slope of the cutting-force against cutting-speed curve. 3 illustr, 8 ref, 1 table. *Y* *C 6.0*

New experiences with carbide end-milling cutters. Neue Erkenntnisse beim Stirnfraesen mit Hartmetallschneiden

A. Grossmann. *VDI-Zeits* 1957 Vol 99 (15) pp 665-666 (May 21) (In German)

Soviet experiments with carbide milling cutters have been repeated in Germany. Life can be trebled by increasing the clearance angle. The optimum working conditions can be calculated. 3 illustr, 2 ref, 4 tables. *H* *C 6.22*

Examination of the cutting conditions of ceramic tools. Zerspanungstechnische Untersuchungen an keramischen Schneidwerkstoffen

E. Heymel. *Fertigungstechnik* 1957 Vol 7 (11) pp 496-497 (Nov) (In German)

The wear on the back edge and the rake face of tools of ceramic material, particularly C 40, is examined for varying cutting speeds, feeds, chip thickness, cutting angle. 7 illustr. *H* *C 6.23*

The machining of aluminium and aluminium alloys

A. Jager. *Polytechn Tijds* 1955 Vol 10 (21/22) pp 517a-518a; *Inst Met Journ* 1957 Vol 85 (6)—*Metall Abstr* Vol 24 (6) col 526 (Feb) (Original in Dutch)

The sawing, milling, turning, filing and drilling of aluminium are considered. In each case, suitable alloys, cutting tools, cutting speeds and lubricants are recommended. *W* *C 6.6*

Electronic controls of machine tools

D. A. Alexander. *Tooling* 1957 Vol 11 (12) pp 26-33 (Dec)

The theory of control is outlined and the EMI system is described in detail. 7 illustr.

Y *C 6.2*

Economic drilling from the solid. Wirtschaftliches Bohren ins Volle

H. Forster. *Fertigungstechnik* 1957 Vol 7 (11) pp 507-511 (Nov) (In German)

Equations are established relating the cutting forces and pressures to the cutting speed, torque and type of drill used. A graph on a double logarithmic scale of cutting speed *vs* feed is given for various drill steels and shapes of drill. 1 illustr, 4 ref, 5 tables.

H *C 6.0*

New test for tool wear in machining thermosets

A. P. Landall. *Mod Plastics* 1957 Vol 35 (2) pp 143-144, 146 (Oct)

A test is described which has been evolved in order to classify thermo-setting materials in relation to tool wear. A series of holes is drilled in moulded samples under constant load and the difference between the times required to drill the first and last holes is determined. Averaging the differences for 4 series of holes gives the tool wear index (TWI) in seconds. The use of the TWI in studying factors contributing to cutting tool wear and in developing low-wear moulding compounds is demonstrated. 8 illustr. *W* *C 6.6*

Oils for cutting operations

A. E. Lawson, E. G. Ellis. *Petroleum* 1957 Vol 20 (3) pp 99-102 (Mar)

A review of recent developments in the production of oils for use with cutting tools. The cutting fluids are broadly classified as soluble (emulsifiable) or straight, with a further oil-less type almost entirely reserved for grinding operations. 3 illustr.

W *C 6.0 : D 14.2*

Machining methods. Fertigungstechnik

H. Opitz. *VDI-Zeits* 1957 Vol 99 (28) pp 1389-1395 (Oct 1) (In German)

A historical survey is given of the development of tool materials and the concomitant changes in machine tools and shape of cutting edge. 21 illustr, 13 ref.

H *C 6.2*

Modern ceramic cutting tools and their application. Der gegenwaertige Stand in der Anwendung der Schneidkeramik

A. Richter. *Fertigungstechnik* 1957 Vol 7 (11) pp 489-493 (Nov) (In German)

The development of ceramic tools, particularly in Eastern Europe and Germany, is reviewed. The wear, tool life and surface finish obtained with various materials is examined as a function of the cutting speed. Various methods of clamping the ceramic bits are described. 13 illustr. *H* *C 6.23*

Cutting tools of sintered carbides of TiC-base. Hartmetalle auf TiC-Basis fuer Schneidzwecke

R. Wehner, R. Kohlermann. *Fertigungstechnik* 1957 Vol 7 (11) pp 498-500 (Nov) (In German)

9 illustr, 10 ref, 1 table. *H* *C 6.22*

DIAMOND TECHNOLOGY

First published 1942 as "Production Methods for Diamond and Gemstone." The second edition of this book by P. Grodzinski has been revised throughout and considerably enlarged. 840 pages, 486 illustrations, 94 tables, and indexes. From NAG Press Ltd., 226 Latymer Court, London W 6. 54s 6d, post free.

CUTTING AND MACHINING OF GLASS

The structure of glass. Die Struktur des Glases
A. N. Dauvalter. *Steklo i Keram* 1955 Vol 12 (3) pp 12-17 ; *Glastechn Ber* 1957 Vol 30 (11) p 476 (Nov) (Original in Russian)

The binding forces and energy of the atoms in the glass structure are examined. Theoretical considerations lead to the conclusion that the structure of glass at room temperature is the frozen-in equilibrium structure at 400-450° C. This theory is supported by the fact that neither the structure nor the hardness of glass alters when it is heated to 400° C.
H *C 2.51 : C 7.0*

Flextol GW 90/3s machine for glass working
Flextol Engg Co Ltd, The Green, Ealing, London W2. *Glass* 1957 Vol 34 (6) p 264 (June)

Special equipment is described which has been devised for grinding perfect edges on glass sheets which are to be joined at the corners by glass cement. The grinding head is provided with guide rails which can be extended to the required length and which are attached to the work by suction cups. Precision gauges control the position of the guide rails in relation to the work, and also the angle of the cut. Cutting and grinding are carried out by diamond-impregnated grinding wheels. An electric motor with a 3-speed countershaft operates the head through a flexible shaft.

It has been found possible to grind off as much as 3 mm in a single-operation. 2 illustr.
W *C 7.23*

Strength and fatigue of glass at very low temperatures
R. H. Kropschot, R. P. Mikesell (US Nat Bur Standards). *Journ Appl Phys* 1957 Vol 28 (5) pp 610-614 (May)

The strength and fatigue properties of borosilicate crown (BSC-2) optical glass were measured at various temperatures within the range 20 to 296° K. Simple beam specimens with 2-point loading were tested in both the abraded and unabraded condition. The breaking stress for a given condition increases with decreasing temperature. The fatigue decreases with decreasing temperature but still exists at 76° K. 9 illustr, 10 ref, 1 table.
W *C 2.22 : C 7.0*

The structure of glass, heat treatment and viscosity. Struktur des Glases, thermische Behandlung und Zaehigkeit
E. Plumat. *Silic Ind* 1956 Vol 21 (10) pp 391-396 ; (11) pp 447-457 ; *Glastechn Ber* 1957 Vol 30 (11) p 476 (Nov) (Original in French)

Viscosity-temperature curves are plotted for various glasses and conclusions as to their structure are drawn. The ease with which glass can be deformed under pressure at room temperature is examined and found to be strongly dependent on the composition of the glass.
H *C 2.51 : C 7.0*

Atomic chains and the fine structure of glass
V. V. Farasov. *Kristallografiya* 1957 Vol 2 (4) p 489 ; *DSIR Transl Contents Lists Russ Period* 1957 (105) p 49 (Dec) (In Russian)
X *C 2.51 : C 7.0*

Fracture of glass under various liquids and gases
C. J. Culf (ICI Ltd). *Soc Glass Technol Journ* 1957 Vol 41 (199) pp 157T-167T (Apr)

Cone cracks have been measured as a means of studying the effects of liquids and gases on the fracture of glass. 5 illustr, 4 tables, 14 ref.
Y *C 7.21*

Decorative glass panel at Hanover bank
London Sand Blast Decorative Glass Works Ltd, London E3. *Glass* 1957 Vol 34 (7) p 314 (July)

Two photographs of the 100 sq ft decorative glass panel installed at the Hanover Bank, Berkeley Square, are shown. The screen was designed by Laurence Whistler who, 25 years ago, revived the art of diamond engraving on glass. Special techniques in glass working were devised to obtain the requisite relief. 2 illustr.
W *C 7.2 : C 10.2*

Royal visit to North America : Whitefriars commemoration goblets
James Powell & Sons (Whitefriars) Ltd. *Glass* 1957 Vol 34 (9) p 412 (Sep)

A limited number of hand-made lead crystal goblets are being produced in commemoration of the Royal visit to Canada and the USA.

Each of the two designs includes a diamond-point engraved Royal Cypher and lettering appropriate to each country. 1 illustr.
W *C 7.2 : C 10.2*

MACHINING OF STONE, ETC

Tensile and compressive strength of formations
B. C. Craft. *Oil & Gas Journ* 1957 Vol 55 (26) pp 138-139 (July 1)

In order to make tensile and compressive strength tests of rock formations, cores of a number of productive formations were first cut parallel to the bedding planes to a length of 5½ in. in order to provide horizontal planes for vertical cutting. The cores were then clamped in the chuck of a diamond saw and vertical slices 1 in. wide were cut 3 in. deep. A core was then rotated 90° and vertical slices 1½ in. wide were cut. A horizontal cut was then made 3 in. from the top. This resulted in either two or four 1 × 1½ × 3 in. tensile specimens at right angles to the bedding plane. Two-inch cube specimens were also cut from the cores with the diamond saw.

Tensile and compressive strengths for specimens from various formations are tabulated. 1 illustr, 1 ref, 1 table. *W* *C 8.0 : C 9.21*

Ceramic-oxide cutting tools
R. M. Gill (Carborundum Co). *Machinery* (London) 1957 Vol 91 (2351) pp 1341-1346 (Dec 6)

A general account covers the historical background of the properties and advantages of ceramic-oxide tools, and then goes on to make a number of recommendations for their use. In grinding, the following advice is given, on the basis of practical experience : (*i*) the use of bonded diamond abrasive wheels is essential, (*ii*) there must be ample supplies of coolant, (*iii*) for stock removal, a 240-mesh diamond wheel will give good results but for finishing a 400-mesh wheel should be used, (*iv*) heavy grinding cuts shou'd not be taken, 0.001 to 0.002 in. is the maximum for stock removal and 0.00025 in. for finishing passes, and (*v*) wheel speeds are much the same as for carbide grinding. 2 illustr, 2 tables. *Y* *C 8.72 : C 12.21*

Quartz oscillator-plates for higher frequencies
Anon. *ECL NTT Rep* 1957 Vol 5 (5) pp 21-22 (May)

A lapping machine has recently been developed for lapping plates with extremely high precision within 0.1 micron of parallelism of the surfaces. 1 illustr.
Y *C 8.73*

Studies of polished surfaces of pyrite and some implications. I. The optical anisotropism of pyrite. II. The polishing method

R. L. Stanton. *Canad Mineralogist* 1957 Vol 6 (Pt 1) pp 87-103 ; 103-118

The effect of polishing and surface deformation in eliminating optical anisotropism is described.

The nature of polishing deformation in metals and minerals is considered and the disadvantages of current mineralographic techniques discussed. An efficient method of mineral polishing is outlined, based on the use of a wax abrasive mixture and diamond-impregnated napless cloths, and capable of producing a high polish with little relief and low surface deformation. The diamond base prescribed is that devised by L. E. Samuels, consisting of stearic acid 12.5 g, triethanolamine 6.0 ml, water 25.0 ml, and diamond abrasive 0.5 g. Under the conditions of use required, the diamond powder must be in the 0 to 10 micron size range to be effective. A 4 to 8 micron grade is used for the first polishing on a low speed mechanical wheel and a finishing treatment is given on a hand or low speed lap charged with 0 to 1 micron grade. 11 illustr, 11 ref, 7 tables. *Y* *C 8.6*

Plastic deformation of ceramic-oxide single crystals. II

J. B. Wachtman jr, L. H. Maxwell (US Nat Bur Standards). *Am Ceram Soc Journ* 1957 Vol 40 (11) pp 377-385 (Nov)

Tests are described on sapphire and ruby specimens obtained from the Linde Air Products Co. Specimens of periclase (cubic structure) were machined from single crystals supplied by the Norton Co, some orientations being cleaved and others ground and polished on a diamond impregnated lead lap. Rutile specimens were cut from boules obtained from the National Lead Co. Results are given and discussed. 11 illustr, 13 ref, 6 tables. *Y* *C 8.7*

Radomes look to ceramics

Gladding, McBean & Co. *Chem & Engg News* 1957 Vol 35 (41) p 70 (Oct 24)

A radome which can withstand the frictional heat engendered by re-entry into the earth's atmosphere has been developed. A slurry of high purity alumina (97% Al_2O_3 is mixed with a small amount of organic binder and sprayed on a chrome-plated steel mandrel. The radome is oven dried on the mandrel and then separated from the mandrel under pressure. After a preliminary firing at 2,200° to 2,250° F (1,205° to 1,232° C) the radome is machined down to final wall thickness with a diamond tool. 2 illustr.
W *C 8.72*

Sawing graphite

National Carbon Co. *Met Prog* 1957 Vol 72 (5) p 23 (Nov)

A band saw has been announced for slicing a 2 in. slab of graphite from a cylinder of 45 in. diameter to an accuracy of ±1/16 in. 1 illustr.
Y *C 8.7*

A novel type of saw for cutting quartz crystals or other materials

J. E. Thwaites, C. F. Sayers. *PO Electr Engs Journ* 1955 Vol 47 (4) pp 1-3 (Jan) ; *Ind Diamond Rev* 1957 Vol 17 (205) pp 233-236 (Dec)

The saw consists of a thin metal annulus, charged with diamond powder on its inner edge and clamped at its outer edge to the face of a cup or chuck so as to hold the annulus in radial tension. The chuck is fixed on a spindle which rotates at high speed. It can be used for the slicing of quartz, germanium, silicon and other substances when the samples are small and accurate cutting is required. 6 illustr.
Y *C 8.6 : C 12.61*

Diamond coated saws for cutting reinforced plastics

O'Rourke Diamond Co Inc, Engg Dept, 11423 Van Owen St, Nth Hollywood, Calif. *Grinding & Finishing* 1957 Vol 3 (6) p 76 (Nov)

A new line of diamond-coated saws for cutting reinforced plastics is available in over 100 types, mounted and unmounted, with diameters up to 24 in. 1 illustr. *Y* *C 8.71*

GEM POLISHING

Cleaving and grinding losses in diamond polishing. Reib- und Schleifverluste bei der Diamantbearbeitung

W. Fischer, O. Zwetsch. *Neues Jahrb Mineral Abh* 1957 Vol 91 (1/3) pp 52-57 (June) (In German)

An attempt is made to estimate the average loss in weight of diamond during polishing. This is difficult to estimate since much depends on the type of stone and ultimate type of cut produced. Roughly speaking, in whole stones about 25-35% is lost during cleaving and a further 47-56% of the remainder during grinding, so that the finished stone represents 28-40% of the natural stone. When stones have to be sawn, about 1.5-7% is lost in sawing, the percentage decreasing with the size of stone. The total further losses during cleaving and grinding vary between 35-50% and the finished stone represents 50-60% of the as-sawn stone. Some examples are given. *H* *D 4.0*

The art of gem stone carving. Steinschneidekunst

H. Goebeler. *Zeits Dtsch Ges Edelsteinkde* 1957 pp 35-42 (July 10) (Special edition) (In German)

Gem stones can have either recessed or raised engraving. The former kind are more frequent and have been used as seals and signet rings. Engraving of either kind can be carried out with a diamond point held in the hand or mechanically with a soft metal wheel or drill impregnated with a diamond-oil paste.

The historical development of gem stone carving is reviewed and illustrated, and the prospects for reviving this largely defunct industry are examined. 7 illustr.
H *D 6.0*

How to cut and polish star ruby

J. V. Schuller. *Mineralogist* 1957 Vol 25 (11) pp 423-424, 426, 428 (Nov)

The use of silicon carbide impregnated rubber wheels is recommended, with sanding on a wood wheel with silicon carbide grains. Final polishing should be on a maple or boxwood grooved lap using diamond compound. 2 illustr. *Y* *D 4.4*

ROCK DRILLING

Problems of deep drilling. Probleme beim Niederbringen tiefer Bohrungen

Anon. *Industriekurier* 1957 Vol 10 (183) (43) p 590 (Nov 27) (In German)

Report of the technical meeting in Bad Oeynhausen of the Verein fuer Tiefbohrtechnik.

G. Sander lectured on technical equipment. Prof S. Peter showed how some of the problems arising with increasing depth of the bore holes can be solved by special flushing. S. Lechler discussed testing of the drill rod. *H* *C 9.0*

Air and gas drilling gain prestige

J. H. Adams. *Oil & Gas Journ* 1957 Vol 55 (32) pp 123-126 (Aug 12)

Paper to Spring mtg of Mid-Continent District of API Div of Production, Tulsa, Oklahoma.

Rotary drilling with air or gas as a circulating medium has been successful in 4 wells in the extremely hard-rock area of E Oklahoma and NW Arkansas. Results of the new drilling technique show that (*i*) penetration rate increased 184% compared to mud-drilled wells, (*ii*) average footage per bit increased by 630%, (*iii*) optimum rotary speeds were from 40 to 60 rpm, (*iv*) bit life in hard Atoka shale was 300 to 350 ton-hours at optimum rotary speed, (*v*) air velocities below 2,000 ft per minute were insufficient to remove cuttings at depths below 4,700 ft, and (*vi*) average drilling cost reduced by 22%.

It is concluded that if a bit could be developed especially for air drilling, then improved drilling performance could be obtained. 7 illustr, 2 ref.

W *C 9.0*

Small holes pay off for Humble

G. E. Cannon, R. A. Watson (Humble Oil & Refining Co). *Oil & Gas Journ* 1957 Vol 55 (28) pp 92-95 (July 15)

Paper to mtg of North Texas Oil & Gas Assoc, Wichita Falls, Texas.

Exploratory and developmental drilling costs have been reduced by employing smaller hole and casing sizes. Improved rock bits have been used to advantage in the small holes and it is felt that with bits now available, hole size can be further reduced. Good runs with small diamond bits in Southwest Texas made their use appear promising for relatively hard, deep drilling. 3 illustr.

W *C 9.21*

Deep hole drilling in South Africa

G. J. van Eeden (Joy-Sullivan (Africa) (Pty) Ltd). *Mindrill Bits* etc 1957 Vol 8 (5) pp 2-6 (July)

Drilling is almost exclusively with the old B size, a few NX ho'es being drilled up to 8,800 ft. Casing and bore hole deflection are discussed. Double-tube core barrels are used in deep holes in soft ground to assist core recovery, in hard broken formations to increase the footage drilled before plugging, and for intersecting reef horizons. Single tube core barrels are used in solid homogeneous ground. Fifty ft core barrels, made up of 10 ft extensions, are frequently used. The number of extensions depends on the expected life of the diamond crown. All drill rods are high tensile steel. Churn drilling has proved more successful than shot drilling, particularly for diamond drilling. Few contributions have been made to diamond drilling in the last 10 years. There is always a time lag between an innovation and its application, *eg* the W series equipment has been accepted for deep hole work, but all the old B equipment must be used first.

R *C 9.21*

How are turbodrills performing ?

J. A. Mitchell (Dresser Industries Inc). *Oil & Gas Journ* 1957 Vol 55 (27) pp 106, 108, 111-112 (July 8)

Paper to Spring mtg of Rocky Mountain division of API Div of Production, Casper, Wyoming.

The paper summarizes the results of experiments to compare turbodrilling and rotary drilling. With the former method, penetration rates are faster but bit footages lower. The short life of the conventional bits used in turbodrilling (in some cases, 30% of the life of a similar bit in a rotary drill) is held to be the principal obstruction to increased development of turbodrilling.

Conditions are specified under which turbodrilling has been found to be more efficient than rotary drilling. 5 illustr, 2 ref, 2 tables.

W *C 9.0*

Core recovery and presentation in coalfield diamond drilling—a new split inner tube core barrel

K. G. Mosher & coll. *Austral Inst Min Metall Proc* 1957 (182) pt 1 pp 37-54 (June); *IMM Abstr* 1957 Vol 8 (1) p 28 (No 131) (Oct-Nov)

To improve the effectiveness of diamond core drilling, a barrel was needed which would permit recovered ore to be examined before being subjected to the increased fragmentation and displacement inevitable where the core has not been drilling in solid sticks. In conjunction with Triefus (Pty) Ltd, the Australian Joint Coal Board has evolved a barrel with a split inner tube as a result of which core can be more accurately logged, division into lengths for analysis more aptly made, core loss more reasonably allocated to appropriate plies, and a greater percentage of core recovered.

Y *C 9.21*

Underwater drilling for coal

R. J. Salter. *Canad Min Journ* 1957 Vol 78 (8) pp 102-103 (Aug)

Offshore drilling in the NCB's search for coal is described. In the project described, drilling was carried out from a tubular steel drill tower. Silt and loose sand on the sea bed was drilled through and the casing protecting the drill rods was cemented into solid rock at a depth of 210 ft below the platform. The borehole proper was started with a chisel and rotary roller bit drills. A diamond crown was then fitted and drilling with this produced cores down to 3,100 ft. 2 illustr.

W *C 9.21*

Core drill

Allied Drilling Co. *Petroleum Equipt* 1957 Vol 20 (27) p 58 (Mar-Apr)

A portable hydraulic core drill is described which incorporates 4-speed transmission and is capable of drilling to 1,000 ft when powered by a 2 hp motor, or to 3,500 ft when used with a 30 hp engine. The unit drills up to 3 in. diameter holes with diamond core, insert or roller-type bits, on 1 5/16 in. standard E rod. Total weight is approximately 1,000 lb. 1 illustr.

W *C 9.21*

Keys to successful competitive drilling

R. A. Bobo, R. S. Hoch. *World Oil* 1957 Vol 145 (6) pp 112-114, 117-118 (Nov)

The flow pattern below the bit and the effect of viscosity on velocity at the hole bottom are described. Various aspects of jet bit principles are considered. 9 illustr, 4 ref.

Y *C 9.0*

Save up to 25 per cent on 7,500 ft well

J. M. Camp, J. E. Ortloff, R. H. Blood. *Oil & Gas Journ* 1957 Vol 55 (40) pp 141-143 (Oct 7)

Abr of paper presented at ASME Petroleum-Mechanical Conference at Tulsa, Okla, Sep 22-25.

The development of casing and wire-line retractable 3- and 4-core bits is described. The 3-core bit is the more efficient and it is estimated that under proper conditions it could save about 25% of penetration costs in 7,500 ft drilling. It is suggested that retractable diamond bit cutters are a possibility. 3 illustr, 2 tables.

W *C 9.0 : C 9.21*

A new drill the answer

Gulf Oil Corp. *Oil & Gas Journ* 1957 Vol 55 (23) pp 70-71 (June 10)

The new hammer drill consisting of a reciprocating piston for delivering percussion blows to the bit, is claimed to be the answer to crooked holes and hard rock formations which wear out bits and slow up penetration.

W *C 9.0*

An outfit for vibro-rotary drilling of shot-holes in hard rock

G. V. Drogalin, V. K. Rusakov, A. M. Ashavskii. *Gornyi Zhurn* 1957 (9) p 41 ; *DSIR Transl Contents Lists Russ Period* 1957 (105) p 32 (Dec) (In Russian)

X *C 9.0*

Calculating the main parameters of a vibro-rotary drilling outfit

V. A. Kruzhkov. *Gornyi Zhurn* 1957 (9) p 38 ; *DSIR Transl Contents Lists Russ Period* 1957 (105) p 32 (Dec) (In Russian)

X *C 9.0*

Diamond drilling, Collie mineral field, West Australia

G. H. Low. Rep Geol Survey Branch 1953, Annl Report, West Australia Dept Mines (published 1956) ; *Chem Abstr* 1957 Vol 51 (18) p 13668 (Sep 25)

Geological descriptions are given of coal deposits, together with analyses of coals.

W *C 9.21*

Ways of reducing drilling costs

M. I. Stukalov. *Neftyanoe Khoz* 1957 (9) p 7 ; *DSIR Transl Contents Lists Russ Period* 1957 (105) p 57 (Dec) (In Russian)

X *C 9.0*

Water still poses tough question in drilling with air

A. S. Murray, S. P. MacKay. *Oil & Gas Journ* 1957 Vol 55 (23) pp 105-107, 110-112 (June 10)

A report is presented on air drilling tests where the fluid ranged from air to aerated water. A sequence of 11 photographs shows how a rock-bit tooth breaks rock. Conventional and diamond cores were cut with good recovery in both wet and dry holes where the formation was competent. 22 illustr, 2 ref.

W *C 9.21*

Shale bits

Servco Inc. *Petroleum Equipmt* 1957 Vol 20 (4) p 38 (July-Aug)

Developed to fill the gap between rock bit and diamond drilling, the new bit is claimed to be economical when drilling hard rubber-like shale. The new bits consist of 3 components with the core-breaker used inside the bit head. They have pieces of carbide in an elastic matrix so that hundreds of cutting edges are always in contact with the surface to be cut. As particles are torn or worn away, new cutting edges are exposed. 1 illustr. *W* *C 9.22*

The theoretical approach to turbodrilling. I

W. Tiraspolsky. *World Oil* 1957 Vol 145 (6) pp 119, 122-124, 126 (Nov)

Turbo and conventional drilling methods are compared theoretically. 4 illustr. *Y* *C 9.0*

The use and care of diamond drill bits . . . an expert speaks

H. Wallace (Wheel Trueing Tool Co of Canada). *Canad Min Journ* 1957 Vol 78 (10) pp 87-88 (Oct)

Current trends in the use of diamond drills are discussed and advice on their use and care is summarized in 17 'do's and don'ts'.

W *C 9.21*

Experimental determination of leakages of fluid in a turbine drill

V. G. Yasov. *Neftyanoe Khoz* 1957 (9) p 25 ; *DSIR Transl Contents Lists Russ Period* 1957 (105) p 57 (Dec) (In Russian)

X *C 9.0*

37 pound core drill has 200 foot capacity

Wink Corp. *World Mining* 1957 Vol 10 (11) p 60 (Oct)

The 5 hp two-stroke petrol engine with vacuum carburetion permits diamond drilling from any angle with a maximum bit speed of 1,830 rpm. For hard rock and deep holes a mechanical advantage lever is available for applying pressure. 1 illustr.

Y *C 9.21*

WIRE DRAWING

Tests carried out on diamond wire-drawing dies. I

British Diamond Die Federation. *Wire Ind* 1957 Vol 24 (285) pp 831-835, 873 (Sep)

Comparative tests of diamond dies made in this country with those made elsewhere are reported, as well as an attempt to establish the causes of poor die performance and improve the design and specification of diamond dies. The investigations by the technical committee of the British Diamond Die Federation relate to copper wire drawing, but the findings of an independent stainless steel wire drawer are incorporated. No large variation in the amount of wire drawn to fixed tolerances by dies of the same maker was found. No significant differences between different die makes were revealed. Apart from the correlation between die polish and performance, no significant correlation between the results of visual and wire drawing tests exists. Die life is generally determined by too large ovality in the wire drawn. Anomalies may occur when the wire diameter suddenly decreases by 0.00005 in. and remains so for several working shifts. The 'figures of merit' (*ie* logarithm of weight of wire drawn per 0.00001 in. increase in average diameter) are the same as those already reported, *ie* 3.61 to 4.44 for the restricted tolerance tests and 3.38 to 4.70 for the full tolerance test. Recommendations to purchasers are to buy dies within limits of 0.00005 in. and nil of the nominal size and carefully polish to size for maximum service. Regular plotting of the ovality of wires produced by each die is recommended as a guide to performance. 2 tables. *R* *C 11.0*

Die refining with boron carbide abrasive

E. L. Anderson (Norton Co). *Wire Ind* 1957 Vol 32 (9) pp 995, 1052 (Sep)

Diamond abrasive compounds are generally used to produce a high polish on sintered carbide and diamond dies, but boron carbide (Norbide) is increasingly used for ripping and semi-finishing sintered carbide dies. It does not cut as rapid'y as diamond abrasive, but may be used more profusely because it is cheaper. It may be used with conventional die working equipment. For lapping it is applied with a brush or a stick. Various oil suspensions are suitable. Sizes 220 to 240 are used for ripping dies, size 320F for semi-finishing, sizes 400, 500 and 600 mesh for the final finish. For drawing operations where finish matters less than size reduction, the die may be finished by boron carbide only. 3 illustr.

R *D 11.0*

An instrument for the measurement of thin wires. Geraet zum Messen duenner Draehte

M. I. Krysanov. *Stanki i Instr* 1956 Vol 27 (3) pp 33-34 (Mar) ; *Feingeraetetechnik* 1957 Vol 6 (11) pp 525-526 (Nov) (In German—original in Russian)

A pneumatic instrument is described with which the diameter and shape of the cross-section of wires not less than 0.02 mm diameter can be measured during manufacture to an accuracy of within 3 microns. 1 illustr, 1 ref. *H* *C 11.0*

Extremely small permanent magnets

Anon. *NBS Tech News Bull* 1957 Vol 41 (11) pp 179-180 (Nov)

Cunife is an alloy of approximately 60% copper, 20% nickel and 20% iron with an unusual combination of magnetic and mechanical properties; instead of requiring casting or sintering into shape like most highly cohesive magnetic materials, it can be cold-drawn. It is possible to produce permanent magnets of Cunife as small as 0.005 in. in diameter by drawing larger sizes of the material through dies. Even when the material is cold-worked to a point at which the magnetic properties are adversely affected, these can be restored by a simple heat treatment. 4 illustr. *Y* *C 11.0*

Oxide coatings on aluminium wire

A. A. Defoe. *Wire & Wire Prod* 1957 Vol 32 (11) pp 1341-1343, 1401-1403 (Nov)

Y *C 11.0*

Determination of out-of-roundness on ultra fine wire

R. C. Nelson, H. I. Davidson. *Wire & Wire Prod* 1957 Vol 32 (11) pp 1366-1367, 1406 (Nov)

A technique is described for the accurate transverse measurement of the degree of out-of-roundness in tungsten wire of less than 0.001 in. diameter. 3 illustr.

Y *C 11.0*

GRINDING AND POLISHING OF HARD METALS

Grinding of thread cutting tools. Schleifen von Gewindestaehlen

Anon. *Technik & Betrieb* 1957 Vol 9 (11) (insert) (Nov) (In German)

When regrinding thread cutting tools, care must be taken to produce the correct thread profile and allow for the right pitch by using a suitable clearance angle.

Care must also be taken that the grinding conditions, *eg* speed, feed, etc, are suitable to the tool material. 1 illustr. *H* *C 12.6*

Grinding liquids, coolants and lubricants. Schleiffluessigkeiten, Kuehl- und Schmiermittel

Anon. *Technik & Betrieb* 1957 Vol 9 (11) pp 169-171 (Nov) (In German)

The three principal functions of grinding liquids are discussed, *ie* (*i*) the removal of grinding dust, (*ii*) cooling, and (*iii*) lubrication. The effectiveness in this respect of (*a*) aqueous solutions, (*b*) emulsions, and (*c*) oils, is reviewed. *H* *C 12.6 : D 14.2*

Barrel finishing operation improves fatigue strength of jet engine parts

J. D. Marble, C. V. Ruehrwein (Gen Electr Co, Aircraft Gas Turbine Div). *Tool Eng* 1957 Vol 39 (5) pp 99-101 (Nov)

Test results showing stock removal, range of surface roughness and fatigue endurance are tabulated for seven finishing methods, including abrasive wheel grinding, electrolytic grinding and electro-discharge machining. The view that grinding operations induce stresses detrimental to long fatigue life was disproved by the tests. These stresses are the result of thermal damage to the surface which can be avoided by care in grinding. 2 illustr, 1 table.

Y *C 12.6 : C 12.9*

Technique for thinned polished sections

A. G. King (US Geol Survey). *Am Mineralogist* 1957 Vol 42 (9/10) pp 689-693 (Sep-Oct)

In contrast to polishing a thin section, thinning a polished section is independent of the polishing operation. Any polishing method may be used on the sample, the method used in the laboratory consisting of sawing, embedding, impregnating with plastic, prepolish surfacing and polishing. The actual polishing is a technique developed by E. Sampson (Princeton Univ), using silk-covered laps, diamond abrasive in oil and pressure against the specimen being polished. For thinning, the briquette is sawed with a cut parallel to and about $\frac{1}{4}$ in. below the polished surface. Either a saw blade with small diamond fragments sintered into bronze around the periphery or a silicon carbide blade is satisfactory. The only special equipment required for thinning is a slow lap speed. The primary use of thinned polished sections is the study of the relation between transparent and opaque materials. 3 illustr, 6 ref. *R* *C 12.61*

Examples of new metallographic techniques. Anwendungsbeispiele fuer neuere Verfahrenstechniken in der Metallographie

L. Koch, G. Hein, S. Keste. *Metall* 1957 Vol 11 (12) pp 1038-1045 (Dec) (In German)

New developments in various metallographic techniques are described, including the polishing of taper sections. Surface roughness can be tested by means of an interference attachment to the Reichert metallographic microscope. The objective has a 15 × magnification and a numerical aperture of 0.25 and can measure roughness within the range of 1 to 0.01 micron.

In microhardness testing the introduction of the Knoop diamond indenter has made it possible to measure the indentation hardness of thin surface layers. In softer metals, on the other hand, the Vickers indenter penetrates more deeply and thus Vickers hardness measurements are less affected by the hardened surface layer of the polished section. 25 illustr, 19 ref.

H *C 4.32 : C 12.61*

Cylinder size controlled automatically

Micromatic Hone Corp. *Prod Engg* 1957 Vol 28 (10) p 88 (Sep 16)

An 8-spindle Microhoning machine permits finish sizing engine cylinders individually to fit any selected piston size. Each honing tool carries an air-gauge sleeve and may be expanded electrically from the control console. Diametric measurements are accurate to 0.0003 in. Bore size is adjustable through a range of 0.004 in. during operation. 1 illustr.

R *C 13.3*

Lapping conical surfaces

Newton Bros (Cudworth) Ltd, Pontefract Road Works, Cudworth, Barnsley, Yorks. *Tooling* 1957 Vol 11 (12) p 51 (Dec)

The Simplex bench lapping machine, although designed for producing accurate conical surfaces on the ends of diesel fuel injector needles, can be used on any similar work where accuracy of angle is required together with a surface finish of 2 to 3 micro-in. 1 illustr. *Y* *C 13.2*

Grinding machines. Schleifmaschinen

Anon. *Industrieblatt* 1957 Vol 57 (10) pp 460-462 (Oct) (In German)

Grinding machines developed and marketed in the East German Republic are described. 6 illustr.

H *C 12.6*

How to sharpen your gundrills

Eldorado Tool & Mfg Corp, Milford, Conn. *Canad Machinery* etc 1957 Vol 68 (11) pp 110-111 (Nov)

A sight gauge is described by which the sharpening of gundrills, or deep hole drills, is claimed to become a simple and accurate process. Amounts to be ground off depend on the damage to be removed at the outer corner of the outer angle. Sharpening can continue until there is practically no carbide left or, in the case of inserted tips, until the radius behind the cutter meets the centreline of the tool. 4 illustr.

Y *C 12.21*

Transistors, reliability and surfaces

C. G. B. Garrett. *Bell Lab Rec* 1957 Vol 35 (11) pp 466-470 (Nov)

In the manufacture of transistors and other semiconductor devices, inadequate control of surface technology may lead to poor initial performance and long term unreliability, largely due to a thin film of oxide on the semi-conductor surface. Recent experiments on the effects of light and of electric field on germanium surfaces have helped to establish the basic physics and chemistry of these effects. 10 illustr.

Y *C 12.6*

Combined sawing and filing machine. Kombinierte Saege- und Feilmaschine

Gebr Thiel GmbH, Sand, Bez Kassel. *Werkstattstechnik & Maschbau* 1957 Vol 47 (11) p 620 (Nov) (In German)

A new sawing and filing machine, Thiel Produro III, used for gauges, jigs, drawing and stamping dies, can be fitted with steel or diamond saws, files or lapping and polishing tools. The main feature is a very accurate and sensitive movement. The amplitude and speed of the stroke are continuously adjustable between 25-60 mm and 85-385 strokes per minute respectively. An attachment is also produced with which hardened steel, ceramic materials and carbides can be machined. 2 illustr. *H* *C 12.2*

A study of the deformed layer produced on metal surfaces by mechanical machining, abrasion and polishing operations

L. E. Samuel (Defence Standards Labs, Australia). *Electroplating & Met Finish* 1957 Vol 10 (10) pp 315-318 (Oct)

The maximum depth of scratches and deformed layer produced by abrasive papers and metallographic polishing operations is discussed and tabulated. The depth of the deformed layer produced during abrasion is probably inversely proportional to hardness, so that the difficulty in producing surfaces free from major strains may be expected to decrease with increasing specimen hardness. However, the cutting rate obtained during mechanical polishing decreases with increasing specimen melting point, reducing the chance of removing a pre-existing deformed layer during polishing treatment of reasonable duration. Electrolytic polishing after abrasion only produces a strain-free surface if it is of sufficient duration to dissolve the deformed layer produced during abrasion, *ie* about 30 minutes. Polishing rates and times required for the removal of abrasion deformation in 70 : 30 brass specimens are given. Removal by diamond abrasive takes 1 minute, as compared with 25 minutes by electrolytic polishing. 8 illustr, 19 ref, 5 tables. *R* *C 12.61*

Temperature field (range) in working metal by flat grinding

A. V. Podzei & coll. *Stanki i Instr* 1957 Vol 28 (10) pp 16-17 (In Russian)

6 illustr, 1 table. *Y* *C 12.6*

UVA type U-55 hydraulic internal grinder

Ulvsunda Verkstader AB. *Machinery* (London) 1957 Vol 91 (2346) p 1040 (Nov 1)

A semi-automatic internal grinder with capacity for bores from ⅛ to 3 in. diameter is intended for operations on small size work, special features being incorporated for this purpose. The reciprocating table carrying the wheelhead is mounted on preloaded anti-friction guideways ; it may be set for very short strokes and is readily reversible at any point. The work-head is also carried on anti-friction guideways. Four spindle speeds from 400 to 750 rpm, are provided for the work-head which may be swivelled through 60° towards the front and 30° towards the rear for grinding tapers. The work-head chuck and diamond truing attachment are hydraulically operated. A UVA Turbo-Head air-driven precision grinding spindle runs at 60,000 to 100,000 rpm and is intended for grinding the smaller hole sizes. 1 illustr. *R* *C 5.0 : C 12.6*

Survey of the 5th European Machine Tool Exhibition. Umschau auf der 5. Europaeischen Werkzeugmaschinen-Ausstellung

Anon. *Ind Anzeig* 1957 Vol 79 (89/90) pp 1403-1422 (Nov 8) (In German)

Schmid & Wezel, Maulbronn (Wuertt), showed a high revolution hand grinding machine for use with small abrasive grinding wheels. It has a ¼ hp motor which operates at 45,000 rpm so that at normal grinding pressures it is slowed down very little.

G. Eickhoff GmbH, Bochum, showed a grinding and lapping machine on which the tool face and chip-breaker groove can be ground and lapped with diamond wheels without resetting the tool. 61 illustr.

H *C 12.21*

Cutting machines at the 5th European Machine Tool Exhibition. VIII. Grinding machines. Spangebende Maschinen auf der 5. Europaeischen Werkzeugmaschinen-Ausstellung. VIII. Schleifmaschinen

Anon. *Ind-Anzeig* 1957 Vol 79 (89/90) pp 1382-1387 (Nov 8) (In German)

Numerous machines are illustrated and described. 18 illustr. *H* *C 12.6*

Cutting machines at the 5th European Machine Tool Exhibition. IX. Lapping, honing, precision honing and rolling tools. Spangebende Maschinen auf der 5. Europaeischen Werkzeugmaschinen-Ausstellung. IX. Laepp-, Hon-, Feinhonmaschinen und Glattwalzgeraete

Anon. *Ind Anzeig* 1957 Vol 79 (89/90) pp 1387-1390 (Nov 8) (In German)

Numerous machines are illustrated and described. 10 illustr. *H* *C 13.0*

Glow discharge process hardens precision parts

B. Berghaus. *Canad Machinery* etc 1957 Vol 68 (11) p 111 (Nov)

An ionitriding process has been developed which permits the hardening even of precision ground parts without distortion. Heat is produced by high current glow discharges. 1 illustr. *Y* *C 12.2*

The introduction of automation into tool grinding. Introduction de l'automation dans l'affutage

Ets Suisses R. Dahinden, SA, 123 rue Antoine Dansaert, Brussels. *L'Usine Belge* 1957 Vol 34 (1530) pp 11-12 (June 15) (In French)

Details are given of the Haro-Polymatic 2 and 3 tool grinding machine produced by R. Habib, Geneva.

H *C 12.21*

Grinding and milling machines of German construction —a cross-section of modern production. Schleif-Fraesmaschinen deutscher Bauart—ein Querschnitt moderner Konstruktionen

K. W. Michler. *Metall* 1957 Vol 11 (12) pp 1045-1055 (Dec) (In German)

Various modern German grinding machines are illustrated and described. 26 illustr.

H *C 6.0 : C 12.6*

A case study : a difficult special tool grinding job solved

J. Miller, H. Gascon, R. Creel (Burroughs Adding Machine Co). *Tooling & Prodn* 1957 Vol 23 (8) pp 99-100 (Nov)

Using a Royal-Oak universal form relieving fixture and grinder it was found possible to grind and maintain the pilot diameter size while form relieving the end cutting portions of the tool. 5 illustr.

Y *C 12.21*

A pneumatic control for external grinding machines. Pneumatisches Kontrollgeraet fuer Aussenrund-schleifmaschinen

I. N. Petrow. *Feingeraetetechnik* 1957 Vol 6 (11) pp 497-498 (Nov) (In German)

3 illustr, 1 ref. *H* *C 12.6*

Abrasive cutting off. Le tronçonnage par abrasion

R. Robin. *Machine-Outil Franç* 1957 Vol 22 (126) pp 117, 119, 121, 123 (Nov) (In French)

(Cont). Diagrams are given relating the time taken for each operation and the wheel life to the diameter of the metal bars or tubes cut off. The importance of cooling is stressed. Abrasive cutting off can be used to produce thin sections of high surface finish. The risk of wheel fracture is examined and American standard limits of peripheral wheel speed are given. (To be cont). 10 illustr. *H* *C 12.6*

Factors influencing the type of surface obtained during grinding. Einfluesse auf die Oberflaechengestalt beim Schleifen

G. Roehlke, T. Lofnes. *Industrieblatt* 1957 Vol 57 (10) pp 465-472 (Oct) (In German)

Experiments are described in which the surface finish is measured (with the Talysurf) as a function of the hardness and grain size of the grinding wheel, the speed, rate of feed and the cooling agent. 26 illustr.

H *C 12.6 : D 15.4*

Drilling, milling, broaching, sawing, planing, grinding and special machines at the 5th European Machine Tool Exhibition at Hanover. Bohr-, Fraes-, Raeum-, Saege-, Hobel-, Schleif- und Sondermaschinen auf der 5. Europaeischen Werkzeugmaschinen-Ausstellung in Hannover

F. W. Simonis. *VDI Zeits* 1957 Vol 99 (33) pp 1654-1677 (Nov 21) (In German)

A large number of grinding machines are illustrated and described. 93 illustr.

H *C 6.0 : C 12.6*

NEW MACHINING METHODS

The electro-sparking method of sharpening cutters

S. N. Evsyutin. *Steklo i Keram* 1957 Vol 14 (6) p 20 ; *DSIR Transl Contents Lists Russ Period* 1957 (105) p 84 (Dec) (In Russian)

X *C 12.9*

Ultrasonic machining

Anon. *Machine Design* 1957 Vol 29 (23) p 162 (Nov 14)

Conventional roughing cuts can now achieve tolerances of ±0.0005 in. with a finish of 25 micro-in. rms. Where finer finishes are required, a diamond paste slurry can be used for finishing cuts, giving a finish of about 10 micro-in. With carbide or tool steel parts, conventional lapping may follow to produce a mirror finish and any degree of precision required. 5 illustr.

Y *C 12.9 : C 13.0*

Developments in ultrasonic machining

Kerry's (Ultrasonics) Ltd, Harold Hill, Essex. *Machine Shop Mag* 1957 Vol 18 (12) pp 746-748 (Dec)

The Sonorode 2kw ultrasonic drilling machine is powered by a Mullard 2kw generator operating on a frequency of approximately 20 kc. Tapping and thread generating applications are described. For generating ¼ in. BSF threads ½ in. deep, the operating times taken were : carbon 15 seconds, 'Ferrox-cube' 16 seconds, glass 75 seconds, 'Sintox' 7 minutes and tungsten carbide 15 minutes. 4 illustr.

Y *C 12.9*

Silicon transistor manufacturers open new British plant

Anon. *Instr Pract* 1957 Vol 11 (11) pp 1166-1167 (Nov)

Texas Instruments Inc, of the United States, are now manufacturing in England as Texas Instruments Ltd. The silicon crystals are divided into bars by an ultrasonic cutting device. 5 illustr.

Y *C 12.9*

Electric erosion machine with grinding attachment

Electro-Spark Co Inc. *Machinery* (NY) 1957 Vol 64 (3) p 236 (Nov)

A new erosion grinding attachment has been added to the E-400 electric erosion machine, rendering it capable of use on all types of jobs from die-sinking to grinding. 2 illustr. *Y* *C 12.9*

A new idea in spark-machining

J. D. Shoemaker. *Machinery* 1957 Vol 64 (3) pp 147-150 (Nov)

In the original equipment the electrode spindle was on top and fed down to the work in the trough. With the electrode spindle an integral part of the table in the new equipment, greater accuracy is obtained. 4 illustr.

Y *C 12.9*

POWDER TECHNOLOGY

Critical considerations on particle-size determination by sieve analysis, air elutriation, sedimentation and the Blaine test

W. Batel. *Chem-Ing-Technik* 1957 Vol 29 (9) p 581 (Sep) ; abstr *Angew Chem* 1957 Vol 69 (18/19) (insert) (Sep 25) (In German)

W *D 7.5*

Preparation of very fine grain sizes

K. Buechel. *Chem-Ing-Technik* 1957 Vol 29 (2) p 77 (Feb) ; abstr *Angew Chem* 1957 Vol 69 (4) (insert page) (Feb 21) (Original in German)

The Rheax process serves as one of the modern methods for classification and de-dusting of sand for concrete, and for the separation of very fine grain mixtures in various industries. Further fields of application are open to this method.

W *D 7.5*

An apparatus for hand-picking mineral grains

M. V. N. Murthy (Geol Survey of India). *Am Mineralogist* 1957 Vol 42 (9/10) pp 694-696 (Sep-Oct)

A soft plastic water-pistol is used as a suction device for collecting grains through an intravenous needle and polyethylene tubing into a glass vial. The operation consists of segregating grains with a needle held in one hand and collecting them with the apparatus held in the other. The process is quick and the strain of hand-picking procedures reduced. The apparatus is inexpensive and has proved useful in separating pure concentrates of zircons for age determinations. 2 illustr.
R *D 7.0*

Particle size distribution counter uses electronics, cuts costs and time

Coulter Industrial Sales Co. *Engg & Mining Journ* 1957 Vol 158 (10) p 35 (Oct)

Particles in a fluid suspension are sized by forcing the fluid through an aperture with an electrode on each side. As the particles pass, aperture resistance changes in proportion to the particle size and the resultant electrical impulses are recorded and counted. Standard apertures cover the 2 to 70 micron range, while special units are available for reading below 1 micron and up to 100. 1 illustr.
Y *D 7.5*

The jet mill. Die Strahlmuehle

H. Schaeffer. *VDI Zeits* 1957 Vol 99 (22) p 1069 (Aug 1) (In German)

The grain size obtainable by mechanical mills is limited by the fact that the charge gradually becomes spherical and can then be broken up no further. The limiting diameter is about 10 microns. A much higher degree of comminution can be achieved by agitating the charge in a cylindrical chamber by means of a jet of compressed air or gas. Grain sizes as low as 0.1 micron can be obtained with this type of jet mill. 1 table.
H *D 7.2*

DIAMOND TOOL PRODUCTION AND DIAMOND RECOVERY

Clarified coolant improves grinding standards

E. C. Hall. *Metalworking Prodn* 1957 Vol 101 (40) pp 1791-1793 (Oct 4)

The De Laval Turbomatic centrifuge, developed by the Alfa-Laval Co Ltd, is stated to be capable of extracting almost 100% of the solid matter from oil or aqueous coolant. The machine has a throughput capacity of 2,200 gal per hr and bowl capacity of 4 gal sludge. The 5 hp motor is coupled to the sludge bowl, which rotates at 1,450 rpm. Clarification is by centrifugal force only. The unit is installed in the coolant system by connecting the return pipe from the grinder to the inlet of the centrifuge, the discharge side being connected to the grinder coolant tank. All sludge is thrown onto the sides of the bowl and held there until it is discharged into the sump by the control switch. An analysis is provided of typical grinding sludge extracted from the Turbomatic centrifuge. 6 illustr.
R *D 7.6 : D 14.2*

The mechanism of sintering

Anon. *Met Ind* 1957 Vol 91 (23) pp 481-482 (Dec 6)

A review is given of recent research work. 2 ref.
Y *D 13.5*

LITERATURE REQUESTS

Please quote the page number of the journal containing the original reference, and the author and title of the article, in all cases.

SURFACE FINISH TESTING

Surface finish

K. S. Collart (Brush Electronics Co). *Prod Engg* 1957 Vol 28 (10) pp 82-83 (Sep 16)

Optimum finish is the roughest that will meet the requirements of product performance and appearance. Surface irregularities may be critically important in highly stressed parts and for corrosion resistance. Tool life is a function of surface finish. Equipment is available for checking most surfaces, but tracing heads cannot reach very small surfaces. Calibrated samples are available to evaluate instrument performance and check stylus-tip condition. These may be used in conjunction with graphs of the average relation between stylus-tip radius, surface finish and error in surface-roughness meter reading.
R *D 15.4*

Surface finish

R. E. Reason (Taylor, Taylor & Hobson Ltd). *Prod Engg* 1957 Vol 23 (10) pp 77-81 (Sep 16)

Various methods of measuring surface finish and converting stylus movement into electric potential are discussed. The spacing to be taken into account in measuring roughness height varies from a few thousandths of an inch in diamond turning to a few tenths in shaping and planing. Correspondingly, the crest spacing of the associated waviness may vary from a few hundredths to a full inch. With electrical instruments, roughness is separated from waviness by an electric wave filter. The distinction between roughness and waviness is made. Much research still remains to be done towards giving every machine operator an instrument by which he can freely check surface roughness. 7 illustr.
R *D 15.4*

How flat is flat ?

J. Stonitsch (Fairchild Camera & Instr Corp). *Tool Eng* 1957 Vol 39 (5) p 114 (Nov)

The flatness of the faces of platens for aerial cameras is critical and conventional dial indicators did not give fully satisfactory results. The problem was solved with an air gauge using a granite surface plate accurate within 0.000050 in. as a reference plane. 1 illustr.
Y *D 15.4*

Standards for surface irregularities

Anon. *Prod Engg—Design Digest Issue* 1957 Vol 28 (15) pp A25-A27 (mid-Oct)

Tables give a list of recommended values for surface irregularities, and physical specimens of surface roughness and lay for variously machined surfaces. Reference and comparison specimens and roughness averages are dealt with. 5 illustr, 2 tables.
Y *D 15.4*

The measurement of surface roughness

G. W. van Santen. *Polytechn Tijdschr* 1956 Vol 11 (5/6) pp 116a-121a ; *Inst Met Journ* 1957 Vol 85 (6)—*Metall Abstr* Vol 24 (6) col 519 (Feb) (Original in Dutch)

After defining surface roughness and related terms, Dutch tentative standards on the subject are reproduced. Current methods of measuring surface roughness are dealt with.
W *D 15.4*

MISCELLANEOUS

The electron microscope. II

D. A. Senior. *Instr Pract* 1957 Vol 11 (11) pp 1162-1165 (Nov)

This part deals with specimen preparation and with types of electron microscopes and their application.
Y *D 15.6*

TRADE LITERATURE

Filtrall industrial filters

C. A. Swales (filters) Ltd, London Road, Dunstable, Beds. 4 pp, 8 × 10½ in., illustr

With the growing realization of the importance of salvaging diamonds from grinding swarf, increasing demands are likely to be made on the industrial filters for use in this operation. The Filtrall unit is a continuous self-cleaning gravity filter that removes solids from liquids that will flow by gravity through filter material, and discharges them in a relatively dry state into an outside container. The filter material rests on and conforms to a flat endless conveyor of open construction. Sloping sides form a shallow pool of the conveyor and an inclined discharge ramp provides for the removal of filtered solids. Dirt-laden liquid is fed onto the filter material and filters through by gravity, leaving the solids on the surface of the material to form a highly efficient filter bed. When the flow through the filter material is reduced by the solids held upon it, the liquid level rises. This raises a float which actuates a switch and causes a conveyor to carry the filtered material forward and bring clean filtering material under the incoming liquid. The float drops as the level of the liquid lowers, the conveyor stops until the need for clean filter material again causes the liquid level to rise, and the cycle is repeated.

Y *D 7.6*

The Studler all-purpose grinding fixture

S & D Engineering Co, 2051 West Mountain Street, Glendale 1, Calif. 1 p, 8½ × 11 in., illustr

This tool is designed to permit correct grinding of straight or spiral fluted tools with accurate reproduction. With the spring head and multiple lobe cams, all end cutting tools can be ground with the correct relief, fast and accurately. One of the important features of the tool is index grinding. The hand wheel has 24 equally spaced holes on one side and 35 holes on the other. This combination offers 11 different cornered shapes that can be ground. In the leaflet, the set-ups for finger and index grinding for axial and radial relief and semi-circular grinding are described and illustrated.

Y *C 12.6*

Unahone

Dow Mechanical Corp, Thompsonville, Conn. 1 p, 8½ × 11 in., illustr

By means of the Unahone attachment, drill presses, lathes, milling machines, grinders, or any machine which will accept taper or straight shank tools, can be converted to an internal honing machine in a few minutes. General operating instructions are given and it is claimed that hole sizes to 0.0001 in. can easily be held. *Y* *C 13.3*

Hyprez diamond compound for surface perfection

Engis Ltd, Hyprez Division, Gabriel's Hill, Maidstone, Kent. 8 pp, 8 × 10 in., illustr

The latest Hyprez literature describes and illustrates a number of typical lapping operations, ranging from the lapping of a tungsten carbide wire drawing die to use in a metallographic polishing machine. Diamond compounds are graded from 170 mesh (90 microns) for roughing purposes on all hard materials, down to 25,000 mesh (¼ micron) for the finest metallographic finish on steel, cast iron and similar materials. Within these two extremes there are no less than 9 intermediate grades for a variety of applications.

Y *D 7.0*

Collected catalogues [rubber mounts]

Metalastik Ltd, Evington Valley Rd, Leicester

The company offers a wide range of rubber friction pads and mounts and couplings, including their special Cushyfoot mountings for isolating vibrations from polishing machines, etc, and preventing the transmission of vibrations to sensitive equipment. A new high deflection Cushyfoot type mounting allows the insulation of low-frequency vibration, which was previously impossible without a complicated and expensive arrangement.

Y *C 6.0 : C 12.6*

Collected catalogues [diamond bits]

Mindrill Ltd, 86-106 Plenty Road, Preston N 18, Victoria, Australia

Further Mindrill diamond bit bulletins cover standard ring-set reamer shells in EX, AX, BX, EXT, AXT and NX sizes, single- and double-tube, and the single and multiple step type oriented diamond set reamers. The single step face discharge bit is designed for optimum footage and core recovery, particularly in broken ground. As these diamond set bits are not standard, a special reamer shell and barrel is necessary. The multi-step reamer is a specialized unit designed for reaming a hole from one size to another.

Y *C 9.21*

Penndrill masonry drilling equipment

Pennsylvania Drilling Co, 1201 Banksville Road, Pittsburgh 16, Pa. 4 pp, 8½ × 11 in., illustr

The latest from Penndrill is a four-page illustrated leaflet detailing instructions for drilling with diamond bits. Diamond quality, bit cost and care of bits are dealt with and advice is then given on hole starting, speed of rotation, water volume and clearance of stuck bits. Various other factors in diamond drilling are considered and the difference between first and other grade bits is explained.

Y *C 8.0*

PATENT LISTS

BRITISH

Official Journal (Patents) 1957 (3586) (Nov 6)

788,471 RAPHAEL'S LTD, and RAPHAEL, O. P. Machines for bevelling the edges of lenses.

Official Journal (Patents) 1957 (3587) (Nov 13)

788,965 ABBEY, A. (American Optical Co). Glass cutting machines.

783,720 CARBORUNDUM CO. Diamond abrasive blades.

Official Journal (Patents) 1957 (3589) (Nov 27)

789,312 NICOL & ANDREW LTD. Grinding and honing heads.

Official Journal (Patents) 1957 (3590) (Dec 4)

739,677 TITAN ABRASIVES CO. Resin bonded abrasive articles.

789,728 MAAG GEAR WHEEL & MACHINE CO LTD, and WILDHABER, E. Truing device for a grinding machine.

Official Journal (Patents) 1957 (3591) (Dec 11)

790,147 FLEXTOL ENGINEERING CO LTD. Grinding wheels.

Official Journal (Patents) 1957 (3592) (Dec 18)

790,672 NORTON GRINDING WHEEL CO LTD (Norton Co). Process of making recrystallized silicon carbide articles.

790,734 LENTILLES OPHTHALMIQUES SPECIALES SOC. Manufacture of lenses.

Official Journal (Patents) 1957 (3593) (Dec 23)

790,788 LANDIS TOOL CO. Grinding.

791,014 BIRMINGHAM SMALL ARMS CO LTD. Spark machining.

790,805 HUFNAGEL, G. (trading as HUFNAGEL WERKZEUGFABRIK, G.) Tools comprising hardmetal cutting bodies.

UNITED STATES

Official Gazette 1957 Vol 724 (1-4) (Nov)

2,811,961 V. TENO. Composite grinding wheel forming tool.

2,812,579 W. M. ARCK. Adjustable glass cutting tool head.

2,812,621 W. J. BLAZEK, R. C. EVANS, R. C. BARKLEY, LEMPCO PRODUCTS INC. Apparatus for automatically forming and finishing grooves in workpieces.

2,812,623 S. MESSERSCHMIDT. Grinding machines with wear compensator.

2,812,626 W. OSENBERG, BISTERFELD & STOLTING. Grinding tools for working materials of great strength and hardness.

2,813,378 O. E. HILL, NORTON CO. Cam grinding machine.

2,813,379 G. M. TROTTIER, NORTON CO. Grinding machine.

2,813,957 J. B. GOSLING, GENERAL ELECTRIC CO. Semi-conductor device.

2,813,966 V. E. MATULAITIS, ELOX CORP OF MICHIGAN. Rough and finish machining with stepped electrodes.

2,814,166 L. O. CARLSEN, O. A. JOHNSON, GLEASON WORKS. Grinding machine for sharpening cutters and the like.

2,814,167 N. B. NICHOLS, V. H. FISHER, RAYTHEON MFG CO. Precision drilling machine.

2,814,495 A. W. PLOEGSMA, NORTH AMERICAN PHILIPS CO INC. Stylus and method of making same.

2,814,554 R. A. ROWSE, NORTON CO. Grinding wheels.

SOUTH AFRICAN

Official Journal 1957 Vol 10 (42-47) (Oct-Nov)

Complete Specifications Accepted

3282 T. W. MILLER. Means for separating heavy particles from sands.

1923 L. GREGSON, EDIBRAC LTD. Cutting tools.

610 E. G. HURD, NORTON CO. Process for fusing, atomizing and spraying brittle rigid rods of refractory material.

2137 E. H. CARMAN, BIRMINGHAM SMALL ARMS CO LTD. Spark machining.

3303 J. G. GLASSFORD, HARD METALS LTD. Apparatus for grinding chisels and like articles.

AUSTRALIAN

Official Journal 1957 Vol 27 (35-41) (Sep-Oct)

210,420 C. A. REDFARN. Abrasive article.

SWISS

Patentliste 1957 (19-20) (Oct)

324,758 A. MARCHAND. Machine tool, in particular for horological purposes.

324,765 DEUTSCHE EDELSTAHLWERKE AG. Method of dressing metal-bonded diamond tools.

324,786 E. FOUQUET. Method and machine for copying by grinding.

FRENCH

Bulletin Officiel 1957 Vol 74 (3836-41) (Nov-Dec)

1,153,833 S. CINCERA, G. LAZZARI. Polishing machine for marble, tiles, cement plates and similar materials.

67,931
1,091,295 MARIENBERGER MOSAIKPLATTEN-FABRIK AG. Method and device for grinding tiles for faience murals.

1,153,882 B. GUIGNARD, EBAUCHES SA. Method and machine for rounding off by grinding the rims of plates, in particular of glass plates.

1,154,010 HELLFORS BRUKS AB. Rock drills.

1,154,029 SOC ARL ATELIERS MECANIQUES V. CHOMIENNE. Grinding machine.

1,153,928 W. FERD. KLINGELNBERG SOEHNE. Machine for the special honing of gear wheels.

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GERMAN

Patentblatt 1957 Vol 77 (45-50) (Nov-Dec)

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1,019,097 H. SOEDING, DEUTSCHE GRAMMOPHON GmbH. Cutting head with two or more groove cutting chisels for groove records with sound grooves arranged side by side.

1,019,201 K. H. SCHULTZE, HERBERT LINDNER GmbH. Cooling arrangement on thread producing machines, in particular thread grinding machines.

1,020,121 W. HOELZEMANN, KIELER HOWALDTSWERKE AG. Method for making semiconductor apparatus of small dimensions and device for carrying out the method.

1,020,253 E. KOHRING, A. H. SCHUETTE. Device for grinding the clearance angle on tools, in particular on helically grooved milling rollers.

1,020,775 F. KRAEMER, DEUTSCHE TAFELGLAS AG. Template controlled glass cutting machine.